

Cloud Phase Breakout

Agenda

1:00-1:15: Welcome and update on ongoing group activities (case study overview)

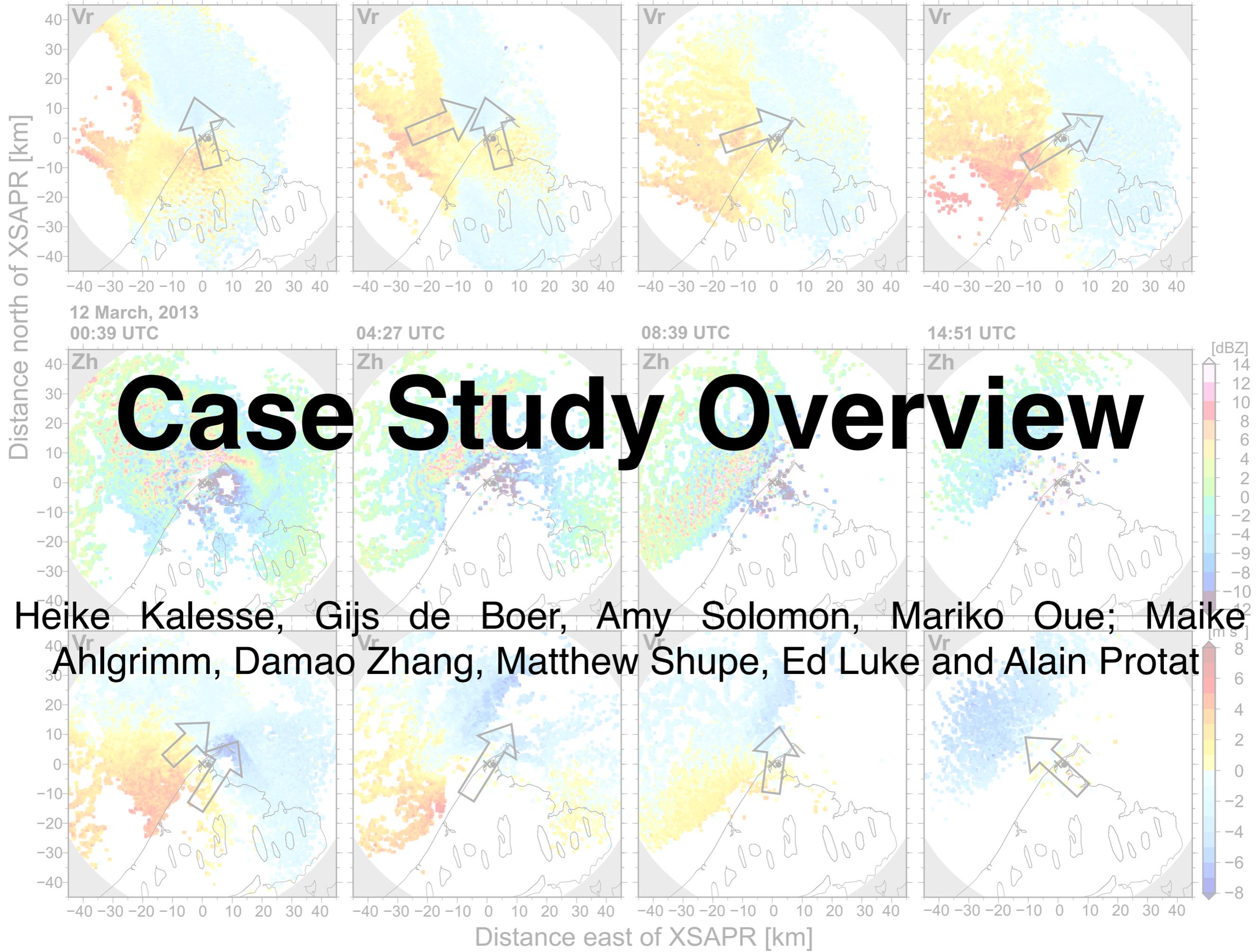
1:15-1:30: Andrew Gettelman: Cloud Phase and Model Biases — ongoing work

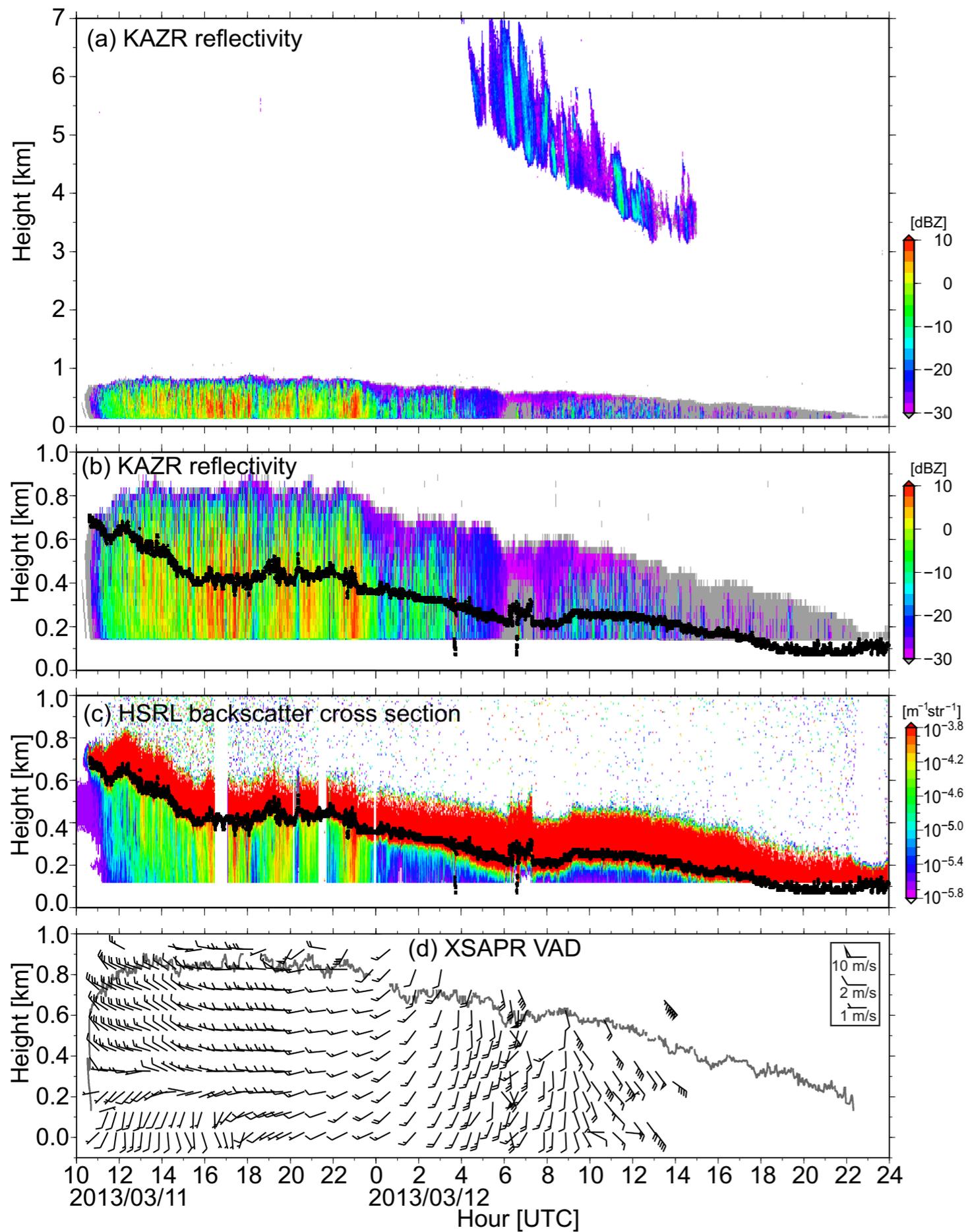
1:30-1:45: Mariko Oue: Polarimetric analysis of Arctic clouds using Oliktok Ka/W-SACR2

1:45-2:00: Paul Lawson: New observational tools for understanding cloud phase and mixed-phase clouds

2:00-2:15: Jing Yang: Aerosol, Cloud Type, Life cycle Dependent Liquid-Ice Mass Partition

2:15-3:00: Discussion on resources, ideas, plans and future directions



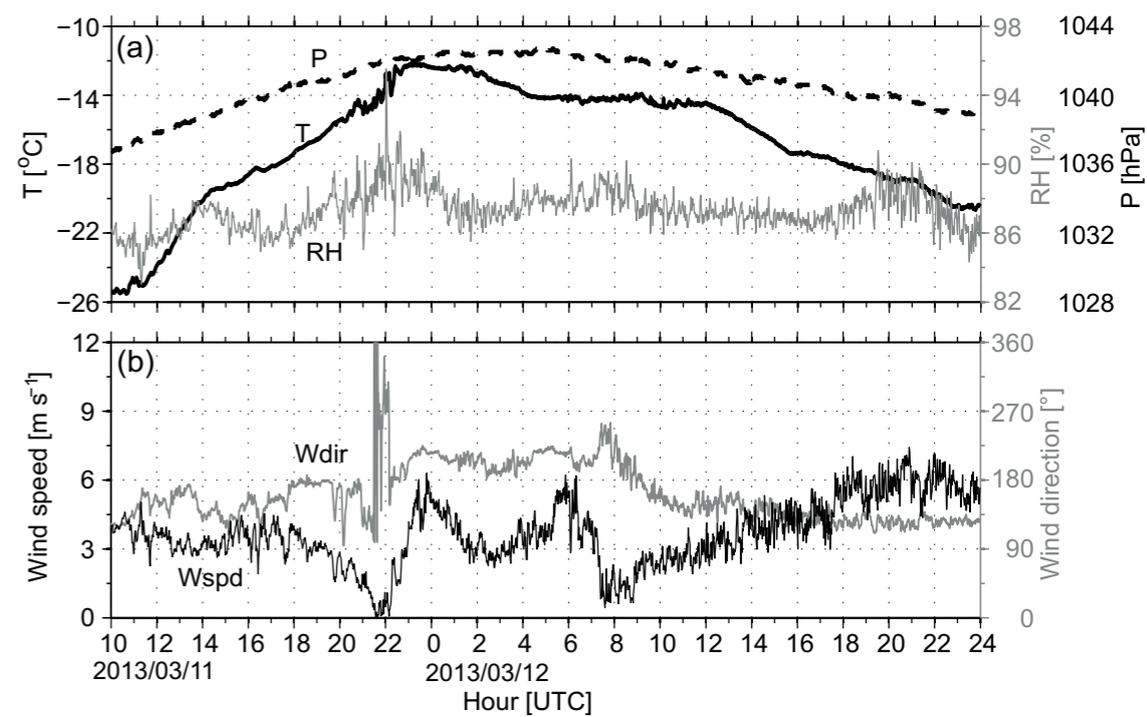
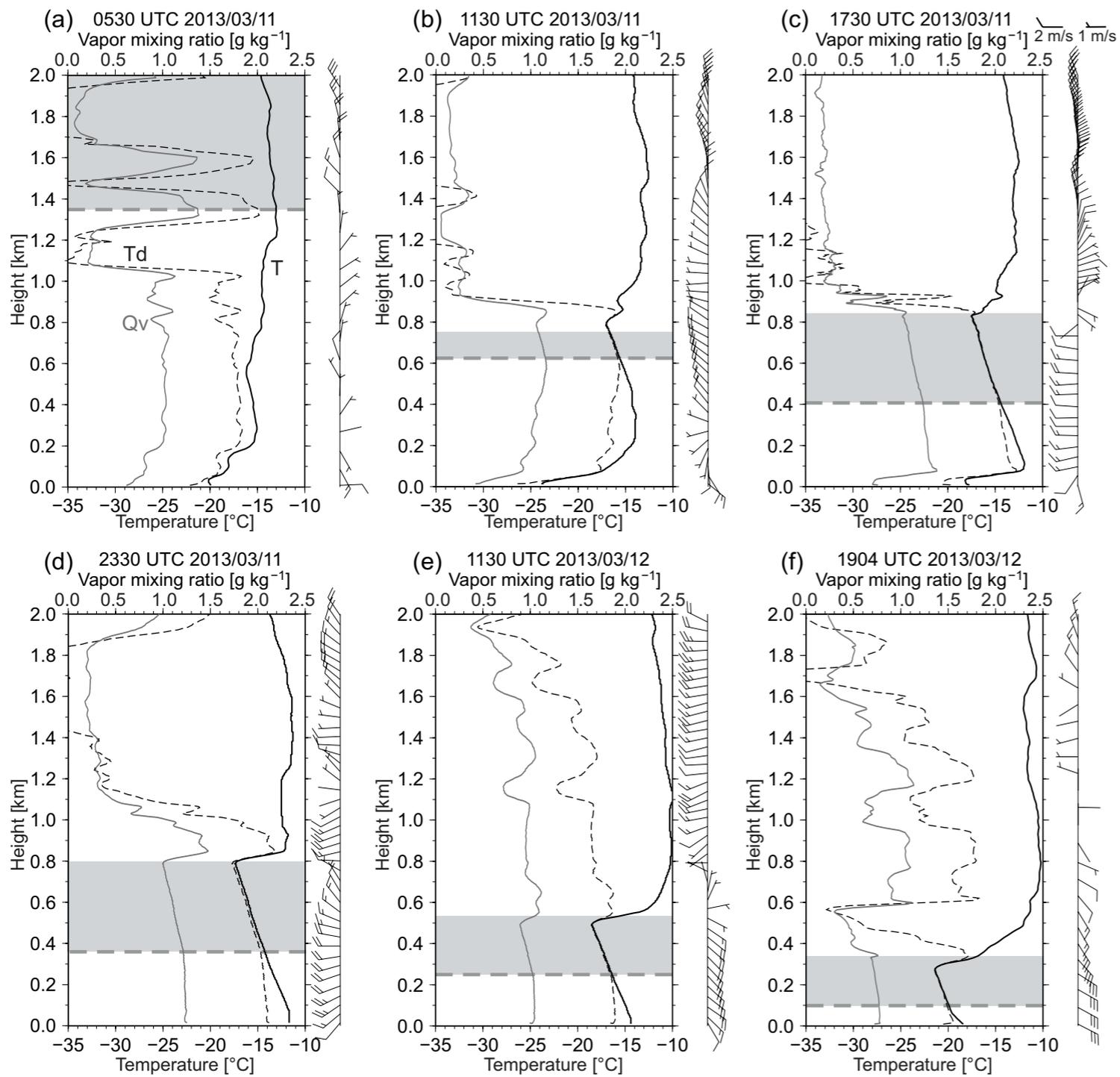


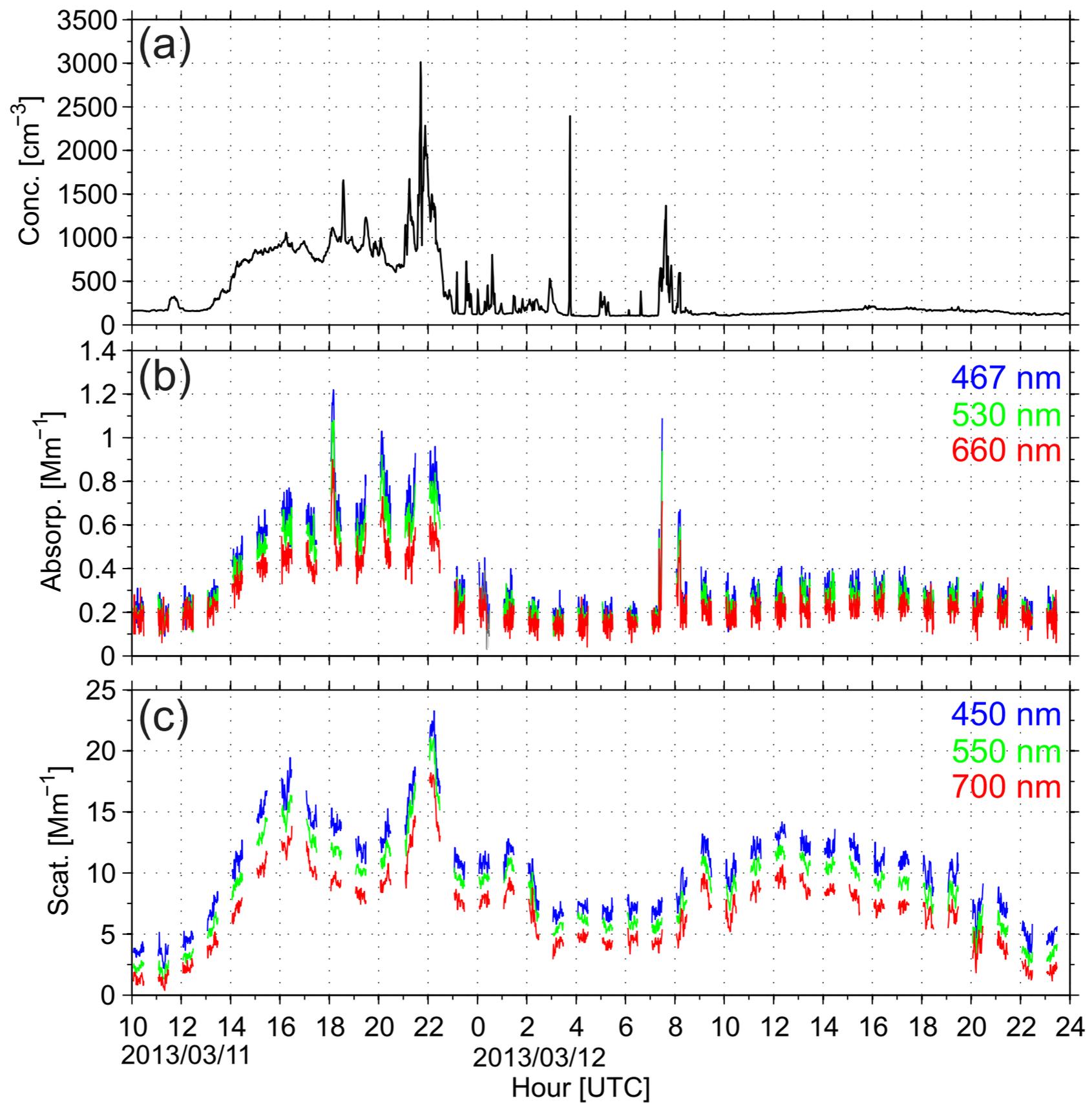
11-13 March

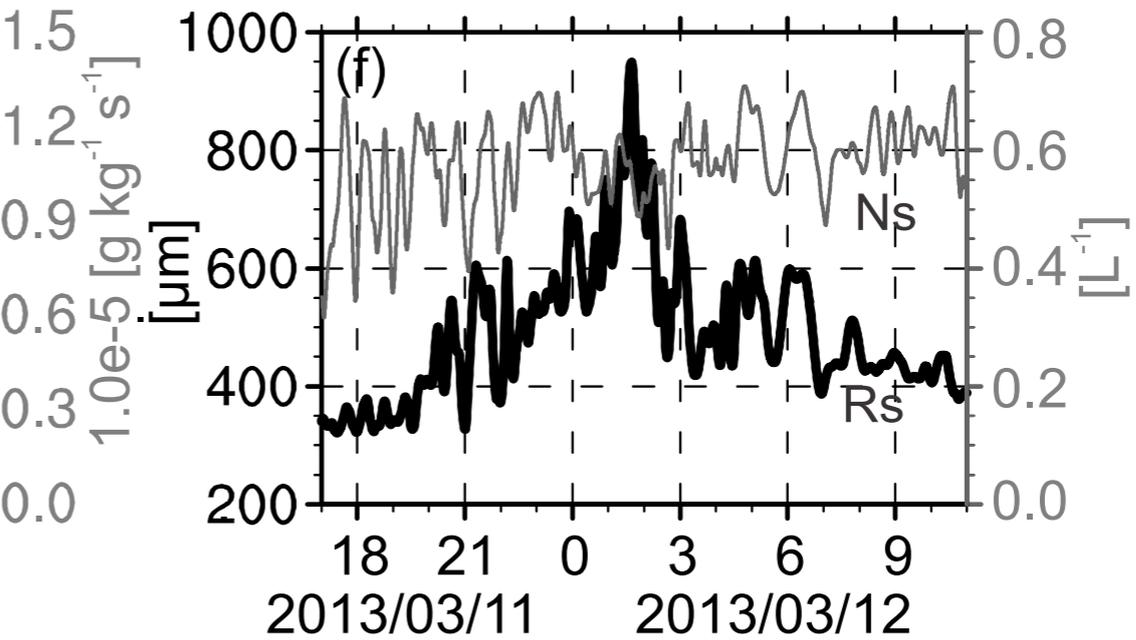
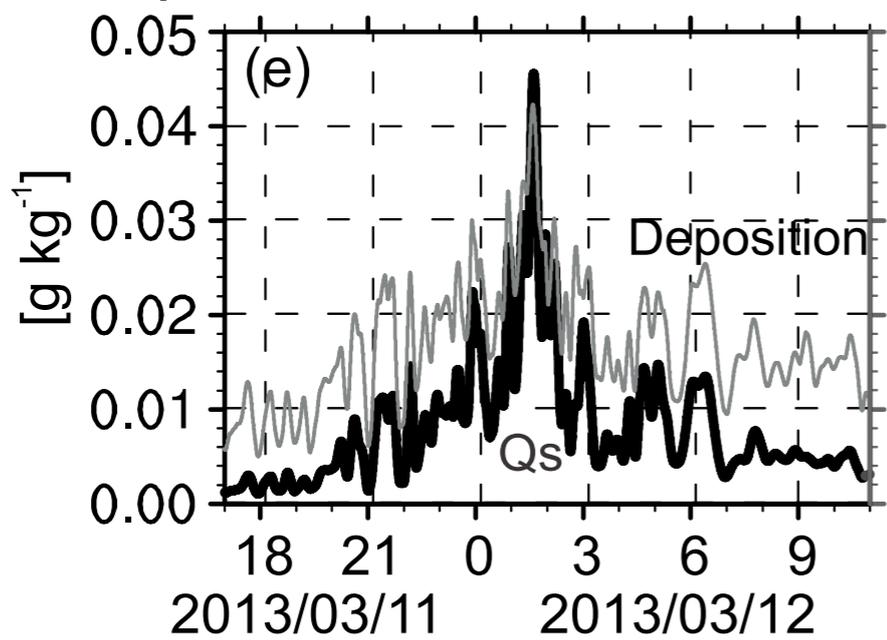
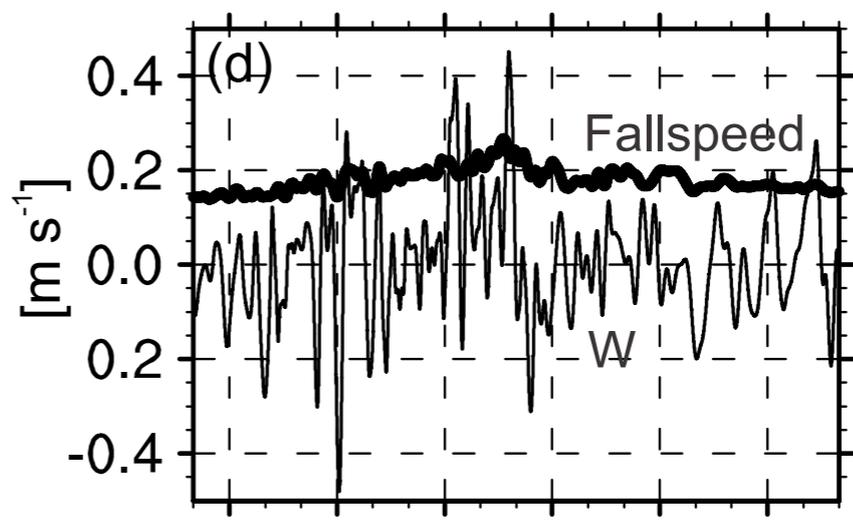
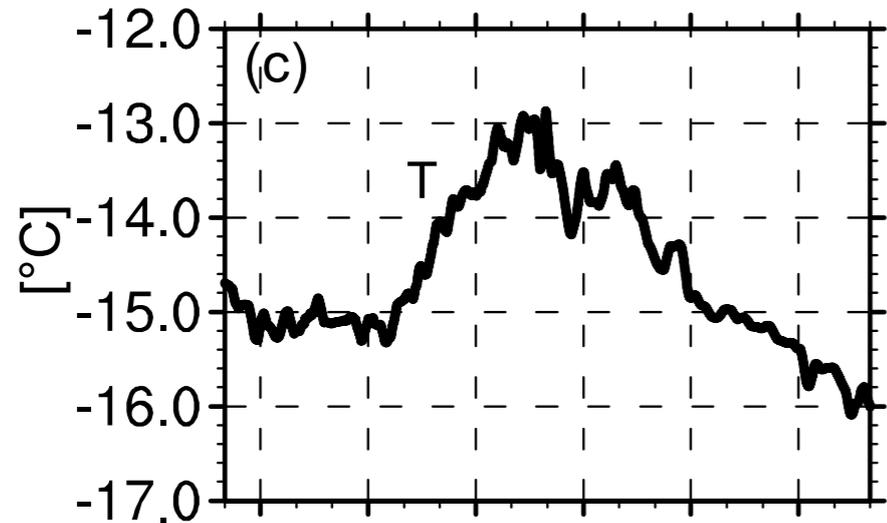
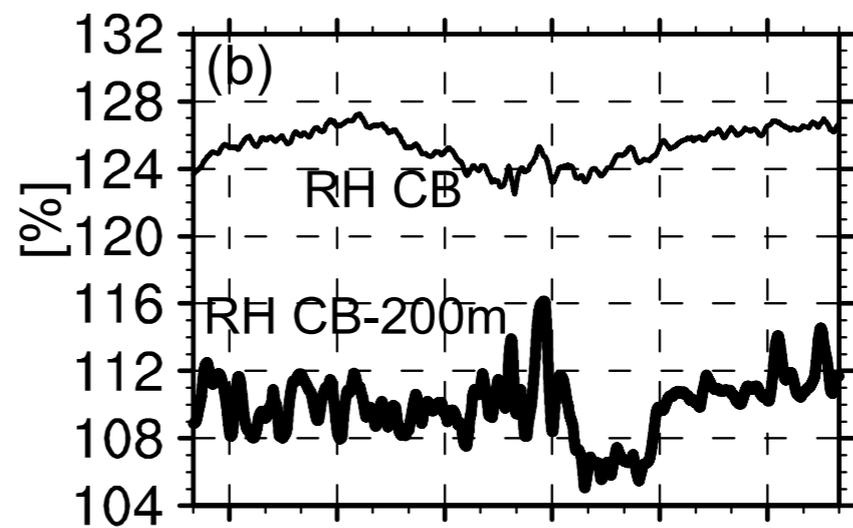
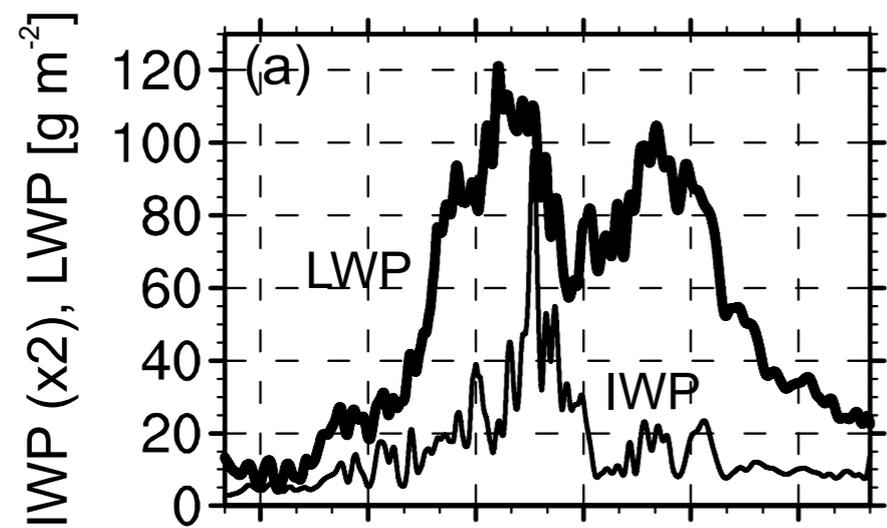
NSA

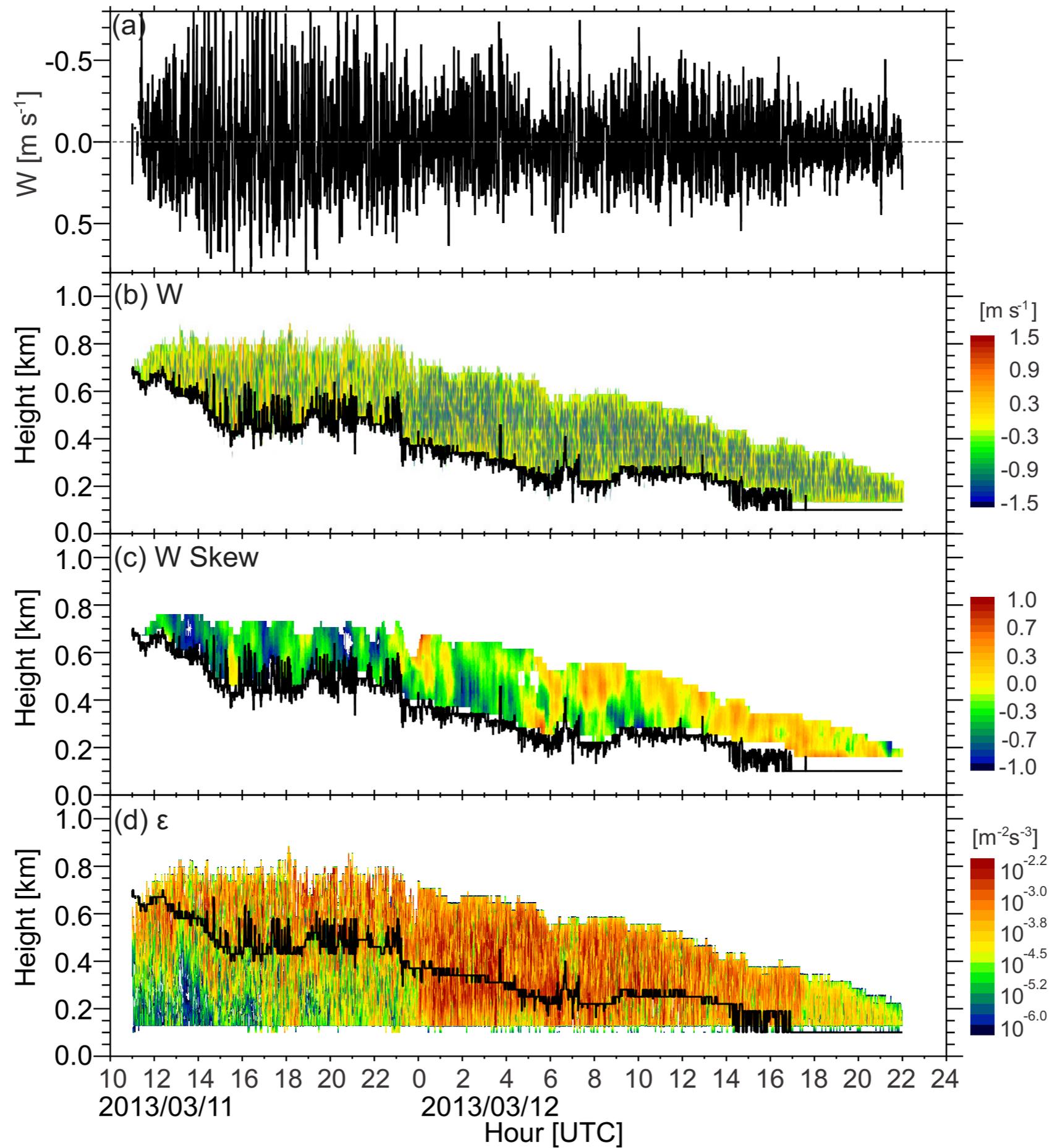
Single Layer Mixed-Phase Cloud

Rapid changes to precip rates









Summary:

- March 11-13 case showed rapid changes in phase partitioning, with substantial decreases in ice production with time
- Cloud-height temperature is cooling with time, so it does not appear that the change in ice production is directly related to the local temperature. However, this shift is also accompanied by a decrease in moisture advection at cloud height.
- Significant shifts in aerosol are observed, with a decrease in aerosol concentration and change in composition (as seen by absorption measurement).
- Internal dynamics of the cloud provide further insight, with decreased vertical velocities (decreased depositional growth) and a change in the coupling state (decoupled to coupled) with time. This shift in the coupling state may have shut down recycling of aerosol into the cloud layer, as the sub cloud area went from sub saturated with respect to ice to saturated with respect to ice, resulting in transport of ice and IN to the surface.

Paper just submitted to MWR:

Kalesse, H., G. de Boer, A. Solomon, M. Oue; M. Ahlgrimm, D. Zhang, M. Shupe, E. Luke and A. Protat (2016): Understanding rapid changes in phase partitioning between cloud liquid and ice in stratiform mixed-phase clouds: An Arctic Case Study, *Mon. Wea. Rev.*, submitted.